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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/726,141	12/01/2003	Kyung-Hyun Park	3364P155	3787

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EXAMINER	
VAN ROY, TOD THOMAS	

ART UNIT	PAPER NUMBER
2828	

DATE MAILED: 03/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/726,141	PARK ET AL.	
	Examiner	Art Unit	
	Tod T. Van Roy	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 January 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,9 and 11-14* is/are rejected.

7)☒ Claim(s) *7-8,10* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

The examiner acknowledges the amending of claim 1.

Response to Arguments

Applicant's arguments with respect to claims 1-14 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-5, 9, 11-12, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nitta et al. (US 6031860) in view of Huang (US 6018541) and further in view of Yoshida et al. (US 2003/0063647).

With respect to claims 1 and 5, Nitta teaches a self-mode locked multi-section semiconductor laser diode comprising: a DFB laser section (fig.1 region 1) that includes a grating (fig.1 #107) and an active structure (fig.1 #104, left side) for controlling the intensity of oscillating laser light, to oscillate laser light in a single mode (taught to be used in single or multi-mode, col.10 lines 1-8); and an external cavity including a phase control section (fig.1 region 2) and an amplifier section (fig.1 region 3, col.9 lines 53-56, taught to amplify the DFB mode at one point of operation), the phase control section having a guiding layer as a passive waveguide (fig.1 #103) that controls a phase variation of feedback laser light (col.8 line 51), the amplifier section having an active structure (fig.1 #104) that controls the strength of the feedback laser light, the DFB section and the external cavity being monolithically integrated on a single substrate, current being independently injected into each of the sections (col.8 lines 56-59). Nitta does not teach the DFB laser section to be complex coupled or that the guiding layer of the phase control section is thicker than any guiding layer of each of the active structures. Huang teaches a DFB laser waveguide wherein the grating is gain-complex coupled (col.3 lines 25-35, inherently varying the effective refractive index and gain). Yoshida teaches a laser device with independently addressable active region, grating, and phase sections (fig.14b), wherein the waveguide in the phase section (fig.14b #5) is thicker than the guiding layer in the active structure (fig.14b #3). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB device of Nitta with the grating structure of Huang in order to align the peaks of the grating with the peaks of the standing wave in the device and in effect amplify the

optical energy of the standing wave (Huang, col.3 lines 45-46), while maintaining the feedback functionality of the grating, as well as with the thick phase region waveguide of Yoshida in order to couple a maximum amount of light between the grating and amplifier active regions and reduce loss of light from evanescent decay into non-waveguiding layers.

With respect to claim 2, Nitta further teaches the laser diode has a buried heterostructure (fig.1).

With respect to claim 3, Nitta further teaches the laser diode has a ridge structure (fig.13).

With respect to claim 4, Huang further teaches the use of a loss coupled grating constructed in a manner which a diffraction grating is formed in an additional absorptive layer (col.3 lines 25-32), which longitudinally periodically varies both effective refractive index and loss (inherent function of the loss grating). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB structure of Nitta and Huang with the loss coupled grating of Huang in order to reduce levels of light reflected back into the device structure (Huang, col.3 lines 55-60).

With respect to claim 11, Nitta further teaches the DFB laser section, the phase control section and the amplifier section are constructed through evanescent coupling in which the sections have a common guide layer (sections coupled through common guide layer fig.1 #103).

With respect to claim 12, Nitta further teaches the phase control section to be located between the DFB and the amplifier sections (fig.1).

With respect to claim 14, Nitta further teaches the facet of the DFB laser section to be coated with an anti-reflection film, whereas the facet of the external cavity, opposite to the facet of the DFB laser region, is coated with a high-reflection film (col.9 lines 5-7).

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nitta in view of Yoshida, Huang and Andrews (US 5175643).

With respect to claim 6, Nitta further teaches the incorporation of a first light guide layer, an active layer, and a second light guiding layer in the DFB and amplifier sections (fig.15 1304,1303, and 1310). Nitta does not teach the layers to be sequentially deposited. Andrews teaches a DFB device wherein an active region is formed between two optical guide layers (col.5 lines 11-14). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB structure of Nitta, Huang, and Yoshida with the guide layer placement of Andrews in order to optically trap light on either side of the quantum well, allowing for trapping more light, and having more control over the guiding of that light.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nitta, Huang, and Yoshida in view of Oka et al. (US 5177758).

With respect to claim 9, Nitta teaches the guiding layer of the phase control section to be arranged through butt-coupling, but does not teach its central axis to accord with those of the active structures. Oka teaches a grated laser structure

incorporated monolithically with a phase control and amplifier section, wherein the central axis of the guiding layer of the phase control section aligns with the active sections (fig.1). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB structure of Nitta, Huang, and Yoshida with the guiding layer alignment of Oka in order to maximize the amount of light coupled from one region to the next through the device.

Claim 13 us rejected under 35 U.S.C. 103(a) as being unpatentable over Nitta, Huang, and Yoshida in view of Kuindersma et al. (US 4995048).

With respect to claim 13, Nitta, Huang, and Yoshida teach the DFB laser device as outlined in the rejection to claim 1, but do not teach the amplifier section to be located between the DFB and the phase control sections. Kuindersma teaches a grated laser structure incorporated monolithically with a phase control and amplifier section, wherein the amplifier section is located between the grating and phase sections (col.2 lines 50-55). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the DFB device of Nitta, Huang, and Yoshida with the device organization of Kuindersma as a matter of engineering design choice, and further could be considered a rearrangement of parts, which has been held to be of routine skill in the art (In re Japikse, 86 USPQ 70).

Allowable Subject Matter

Claims 7-8 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 7-8 are believed to be allowable based on the fact that, a complex coupled DFB laser section monolithically integrated with a phase control and amplifier sections, including in the DFB section a first light guide layer, active region, and second light guide layer, wherein the guide layers are of InGaAsP with a bandgap of 1.3um and a thickness of 70nm, and the active region is of InGaAsP with a bandgap of 1.55um, was not found to be taught in the prior art.

Claim 10 is believed to be allowable based on the fact that, a complex coupled DFB laser section monolithically integrated with a phase control and amplifier sections, including in the phase control section a guiding layer which is arranged through butt-coupling such that its central axis accords with those of the active structures, wherein the guiding layer is of InGaAsP with a bandgap of 1.3um and a thickness of 400nm.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tod T. Van Roy whose telephone number is (571)272-8447. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TVR